

WHAT IS CLAIMED IS:

1. A two-dimensional code recognition processing method for recognizing a two-dimensional code made of a plurality of square cells arranged in accordance with predetermined layout rules, the method comprising the steps of:

generating binary data from image information acquired externally in accordance with a predetermined threshold value;

detecting a reference cell serving as a reference in recognizing said two-dimensional code based on said binary data generated in said binary data generating step;

detecting corner cells each located in a predetermined search range with respect to said reference cell detected in said reference cell detecting step, on the basis of said binary data generated in said binary data generating step; and

detecting code data assigned to said two-dimensional code existing inside an area of a code part enclosed by said reference cell and by said corner cells on the basis of said binary data generated in said binary data generating step.

2. A two-dimensional code recognition processing

method according to claim 1, wherein said reference cell is made of a rectangular black pixel contiguous region which has a predetermined aspect ratio and which includes hollow readable information, and wherein said reference cell detecting step further detects the rectangular reference cell having said predetermined aspect ratio and including said readable information.

3. A two-dimensional code recognition processing method according to claim 2 wherein said readable information is a logo mark attached to a code scheme of said two-dimensional code.

4. A two-dimensional code recognition processing method according to claim 2, wherein said readable information is a name of a corporation associated with said code scheme of said two-dimensional code.

5. A two-dimensional code recognition processing method according to claim 2, wherein said readable information is a Uniform Resource Location abbreviated to URL associated with said code scheme of said two-dimensional code.

6. A two-dimensional code recognition processing method according to claim 1, wherein said reference cell detecting step further detects said rectangular reference cell which serves as the reference in recognizing said

two-dimensional code and which has said predetermined aspect ratio, from a detection start point established as desired and based on said binary data generated in said binary data generating step.

7. A two-dimensional code recognition processing method according to claim 6, wherein said reference cell detecting step further establishes a start point of the most recently detected reference cell as said detection start point.

8. A two-dimensional code recognition processing method according to claim 6, wherein, if there is no start point of the most recently detected reference cell, said reference cell detecting step establishes a center point of the externally acquired image information as said detection start point.

9. A two-dimensional code recognition processing method according to claim 1, further comprising the step of counting a total number of black pixel contiguous regions based on said binary data generated in said binary data generating step, and of changing said predetermined threshold value from one candidate value to another for said binary data generating step in stages until said total number drops below a predetermined region count.

10. A two-dimensional code recognition processing method according to claim 9, further comprising the step of terminating a series of recognition processing steps if said total number of black pixel contiguous regions is at least equal to said predetermined region count after said predetermined threshold value has been set to each of all candidate threshold values in stages, whereupon another series of recognition processing steps are started on the basis of new image information acquired externally.

11. A two-dimensional code recognition processing method according to claim 1, wherein said code data detecting step includes the steps of:

calculating code data from said two-dimensional code existing inside said area of said code part enclosed by said reference cell and by said corner cells on the basis of said binary data generated in said binary data generating step;

calculating check data from said two-dimensional code existing inside said area of said code part; and

verifying said code data calculated in said code data calculating step on the basis of said check data calculated in said check data calculating step.

12. A two-dimensional code recognition processing

method according to claim 1, wherein said binary data generating step further captures image information picked up by external image pickup means so as to generate binary data from the captured image information in accordance with a predetermined threshold value.

13. A two-dimensional code recognition processing apparatus for recognizing a two-dimensional code made of a plurality of square cells arranged in accordance with predetermined layout rules, the apparatus comprising:

binary data generating means for generating binary data from image information acquired externally in accordance with a predetermined threshold value;

reference cell detecting means for detecting a reference cell serving as a reference in recognizing said two-dimensional code based on said binary data generated by said binary data generating means;

corner cell detecting means for detecting corner cells each located in a predetermined search range with respect to said reference cell detected by said reference cell detecting means, on the basis of said binary data generated by said binary data generating means; and

code data detecting means for detecting code data assigned to said two-dimensional code existing inside an area of a code part enclosed by said reference cell and

by said corner cells on the basis of said binary data generated by said binary data generating means.

14. A two-dimensional code recognition processing apparatus according to claim 13, wherein said reference cell detecting means further detects said rectangular reference cell which serves as the reference in recognizing said two-dimensional code and which has said predetermined aspect ratio, from a detection start point established as desired and based on said binary data generated by said binary data generating means.

15. A two-dimensional code recognition processing apparatus according to claim 13, further comprising threshold value changing means for counting a total number of black pixel contiguous regions based on said binary data generated by said binary data generating means, and for changing said predetermined threshold value from one candidate value to another for said binary data generating means in stages until said total number drops below a predetermined region count.

16. A two-dimensional code recognition processing apparatus according to claim 13, wherein said code data detecting means includes:

code data calculating means for calculating code data from said two-dimensional code existing inside said

area of said code part enclosed by said reference cell and by said corner cells on the basis of said binary data generated by said binary data generating means;

check data calculating means for calculating check data from said two-dimensional code existing inside said area of said code part; and

verifying means for verifying said code data calculated by said code data calculating means on the basis of said check data calculated by said check data calculating means.

17. A two-dimensional code recognition processing apparatus according to claim 13, wherein said binary data generating means further captures image information picked up by external image pickup means so as to generate binary data from the captured image information in accordance with a predetermined threshold value.

18. A storage medium for storing a two-dimensional code recognition processing program for recognizing a two-dimensional code made of a plurality of square cells arranged in accordance with predetermined layout rules, the program being executable by a computer and comprising the steps of:

generating binary data from image information acquired externally in accordance with a predetermined

threshold value;

detecting a reference cell serving as a reference in recognizing said two-dimensional code based on said binary data generated in said binary data generating step;

detecting corner cells each located in a predetermined search range with respect to said reference cell detected in said reference cell detecting step, on the basis of said binary data generated in said binary data generating step; and

detecting code data assigned to said two-dimensional code existing inside an area of a code part enclosed by said reference cell and by said corner cells on the basis of said binary data generated in said binary data generating step.

19. A storage medium according to claim 18, wherein said reference cell detecting step further detects said rectangular reference cell which serves as the reference in recognizing said two-dimensional code and which has said predetermined aspect ratio, from a detection start point established as desired and based on said binary data generated in said binary data generating step.

20. A storage medium according to claim 18,



further comprising the step of counting a total number of black pixel contiguous regions based on said binary data generated in said binary data generating step, and of changing said predetermined threshold value from one candidate value to another for said binary data generating step in stages until said total number drops below a predetermined region count.

21. A storage medium according to claim 18, wherein said code data detecting step includes the steps of:

calculating code data from said two-dimensional code existing inside said area of said code part enclosed by said reference cell and by said corner cells on the basis of said binary data generated in said binary data generating step;

calculating check data from said two-dimensional code existing inside said area of said code part; and

verifying said code data calculated in said code data calculating step on the basis of said check data calculated in said check data calculating step.

22. A storage medium according to claim 18, wherein said binary data generating step further captures image information picked up by external image pickup means so as to generate binary data from the captured

image information in accordance with a predetermined threshold value.